What is claimed is:

1. A two-stage method for characterizing a spatial arrangement among data points for each of a plurality of three-dimensional time series distributions comprising a sparse number of said data points, said method comprising the steps of:

creating a first virtual volume containing a first three-dimensional time series distribution of said data points to be characterized;

subdividing said first virtual volume into a plurality k of three-dimensional volumes, each of said plurality k of three-dimensional volumes having the same shape and size;

providing a first stage characterization of said spatial arrangement of said first three-dimensional time series distribution of said data points comprising the steps of;

determining a statistically expected proportion Θ of said plurality k of three-dimensional volumes containing at least one of said data points for a random distribution of said data points such that

$k * \Theta$ is a statistically expected number M of said plurality k of three-dimensional volumes which contain at least one of said data points if said first three-dimensional time series distribution is characterized as random;

counting a number m of said plurality k of three-dimensional volumes which actually contain at least one of said data points in said first three-dimensional time series distribution;

statistically determining an upper random boundary greater than M and a lower random barrier less than M such that if said number m is between said upper random barrier and said lower random barrier then said first time series distribution is characterized as random in structure during said first stage characterization;

providing a second stage characterization of said first three-dimensional time series distribution of said data points comprising the steps of;

when Θ is less than a pre-selected value, then utilizing a Poisson distribution to determine a first mean of said data points;

when Θ is greater than said pre-selected value, then utilizing a binomial distribution to determine a second mean of said data points;

computing a probability p from said first mean or from said second mean depending on whether Θ is greater than or less than said pre-selected value;

determining a false alarm probability α based on a total number of said plurality k of three-dimensional volumes for said first three-dimensional time series distribution of said data points to be characterized;

comparing p with α to determine whether to characterize said sparse data as noise or signal during said second stage characterization; and

comparing said first stage characterization of said first three-dimensional time series distribution of said data points with said second stage characterization of said

first three-dimensional time series distribution of said data points to determine presence of randomness in said time series distributions.

2. The method of claim 1, wherein if said first stage characterization of said first three-dimensional time series distribution of said data points indicates a random distribution and said second stage characterization of said first three-dimensional time series distribution of said data points indicates a signal, then continuing to process said data points.

3. The method of claim 1, wherein if said first stage characterization of said first three-dimensional time series distribution of said data points indicates a random distribution and said second stage characterization of said first three-dimensional time series distribution of said data points indicates a random distribution, then labeling said first three-dimensional time series distribution of said data points as random.

4. The method of claim 1, further comprising utilizing the method steps of claim 1 for characterizing each of said plurality of three-dimensional time series distribution of said data points.

5. The method of claim 1, wherein said first three-dimensional time series distribution of said data points comprises less than about twenty-five (25) data points.

6. The method of claim 1, wherein said upper random boundary greater than M and said lower random barrier less than M are computed utilizing binomial probabilities.

7. The method of claim 1, further comprising obtaining each of said plurality of three-dimensional time series distributions comprising said sparse number of said data points from a sonar system.

8. The method of claim 1, further comprising obtaining each of said plurality of three-dimensional time series distributions comprising said sparse number of said data points from a radar system.

9. The method of claim 1, further comprising determining said false alarm probability α based on a total number of said plurality k of three-dimensional volumes for said first three-dimensional time series distribution of said data points to be characterized wherein:

$$\alpha = 0.01 \text{ if } k \geq 25, \text{ and}$$
$$\alpha = 0.05 \text{ if } k < 25.$$

10. The method of claim 1, wherein said step of comparing p with α to determine whether to characterize said sparse data as noise or signal during said first stage characterization is mathematically stated as:

$$\text{if } p \geq \alpha \Rightarrow NOISE, \text{ and}$$
$$\text{if } p < \alpha \Rightarrow SIGNAL.$$

11. The method of claim 1, wherein said pre-selected value is equal to 0.10 such that if

$\Theta \leq 0.10$, then said Poisson distribution is utilized, and if

$\Theta > 0.10$, then said binomial distribution is utilized.

12. The method of claim 1, wherein a total number Y of said data points is given by $Y = \sum_{k=0}^{K} kN_k$, where

k (number of cells with points)	***N_k*** (number of points in *k* cells)
0	N_0
1	N_1
2	N_2
3	N_3
⋮	⋮
K	N_k

13. The method of claim 12, wherein said step of computing said probability p from said first mean further comprises utilizing the following equation:

$$p = P(|z_p| \le Z) = 1 - \frac{1}{\sqrt{2\pi}} \int_{-|z_p|}^{+|z_p|} \exp(-.5x^2)dx$$

where $Z_P = \frac{Y - N\mu_0}{\sqrt{N\mu_0}}$

where Y is said total number of data points,

where, N is a sample size of said data points for each of a plurality of three-dimensional time series distributions, and

$\mu_0 = \frac{\sum_{k=0}^{K} kN_k}{\sum_{k=0}^{K} N_k}$ is said first mean.

14. A method according to claim 13, wherein said step of computing said probability p from said second mean further comprises utilizing the following equation:

$$p = P(|z_B| \le Z) = 1 - \frac{1}{\sqrt{2\pi}} \int_{-|z_B|}^{+|z_B|} \exp(-.5x^2)dx$$

where $Z_B = \dfrac{m \pm c - k\theta}{\sqrt{k\theta(1-\theta)}}$

where c is a correction factor.

15. The of claim 1, wherein k is determined from the relation

$$k = \begin{cases} k_I \ if \ \mathrm{K}_1 > \mathrm{K}_{II} \\ k_{II} \ if \ \mathrm{K}_I < \mathrm{K}_{II} \\ \max(k_I, k_{II}) \ if \ \mathrm{K}_I = \mathrm{K}_{II} \end{cases}, \text{ where}$$

$$k_I = \mathrm{int}\left(\frac{\Delta t}{\delta_I}\right) * \mathrm{int}\left(\frac{\Delta Y}{\delta_I}\right) * \mathrm{int}\left(\frac{\Delta Z}{\delta_I}\right),$$

$$k_{II} = \mathrm{int}\left(\frac{\Delta t}{\delta_{II}}\right) * \mathrm{int}\left(\frac{\Delta Y}{\delta_{II}}\right) * \mathrm{int}\left(\frac{\Delta Z}{\delta_{II}}\right),$$

$$\delta_I = \sqrt[3]{\frac{\Delta t * \Delta Y * \Delta Z}{k_0}},$$

$$k_0 = \begin{cases} k_1 \ if \ |N - k_1| \le |N - k_2| \\ k_2 \ otherwise \end{cases},$$

$$k_1 = \left[\mathrm{int}\left(N^{\frac{1}{3}}\right)\right]^3,$$

$$k_2 = \left[\mathrm{int}\left(N^{\frac{1}{3}}\right) + 1\right]^3,$$

$$\delta_{II} = \sqrt[3]{\frac{\Delta t * \Delta Y * \Delta Z}{N}},$$

$$\mathrm{K}_I = \frac{k_I}{\Delta t * \Delta Y * \Delta Z} \delta_I^3 \le 1,$$

$$K_{II} = \frac{k_{II}}{\Delta t * \Delta Y \quad \Delta Z} \delta_{II}^3 \leq 1$$

Δt is time interval for collecting each of said plurality of three-dimensional time series distributions,

$\Delta Y = \max(Y) - \min(Y)$ where Y is a magnitude of a first measure of said data points between a maximum and minimum value, and a second measure referred to as Z with magnitude

$\Delta Z = \max(Z) - \min(Z)$ where Z is a magnitude of a second measure of said data points between a maximum and minimum value, and

int is the integer operator.